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(54) **Dairy Blends**

(57) A dairy blend is formed by softening butter and blending therewith water and a water soluble gelling agent and a vegetable oil, and finally cooling the product. The product may contain other additives such as salts, milk, emulsifiers, antioxidants, preservatives, flavouring agents and vitamins as desired. The product is intended principally as a butter substitute and has improved spreadability compared with butter at, for example, refrigeration temperature.

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SPECIFICATION

Improvements in or Relating to Dairy Blends

This invention relates to dairy blends.

The production of butter substitutes derived partially from milk fat is and has been the subject of considerable research. Such butter substitutes as distinct from margarine have no agreed generic name and will be referred to herein as dairy blends. The basic aim of research on dairy blends is to produce a product which has good spreadability at, for example refrigeration temperature, has the flavour of butter and has a consistency which remains substantially constant through fluctuating temperature changes, for example temperature changes caused by the product being removed from refrigerated temperature to room temperatures and then back into refrigeration temperatures.

Many patents have been filed for improved dairy blends some of which have been brought into commercial production. The most recent review covering literature and patents for dairy blends is that by E. J. Mann in Dairy Industries International 1977 42 (3). That author, E. J. Mann, produced an earlier review in the same journal in 1975, Volume 40 (9).

The consistency of butter is dependent upon variations in temperature. As is well-known when butter is completely melted and then solidified again the consistency is different from the original product. This is because the form of crystallization of the solid fats in butter is dependent upon the temperature gradient during crystallization. So that cooling melted butter by placing melted butter in refrigerated temperatures will produce a different product than if the cooling takes place, with lower temperature gradients, down eventually to refrigeration temperature. Even in the latter case however it is difficult to obtain the original consistency of butter.

As reviewed by Mann, the majority of proposals for dairy blends have involved starting from milk fats and mixing these fats with vegetable oils together with other additives. For example Swedish Patent 378,169 of I. T. H. Olsson teaches adding a refined triglyceride oil such as soya bean oil to cream during the churning of the cream in the formation of the butter. The product is said to be spreadable at refrigeration temperatures.

The use of butter itself as a precursor for producing a dairy blend is referred to by Mann as having been the subject of research but it also appears from the review by Mann that no commercial product has resulted from such research. While the applicant is not aware of the reasons for the lack of commercial development of products starting from butter, it is possible that it has been caused by the difficulty in obtaining a satisfactory consistency of butter afer mixing in various additives.

This invention provides a dairy blend in which butter is combined with a deodorized vegetable oil in such amounts as to improve the low temperature spreadability of butter but not such as to make the composition too soft outside of refrigeration temperatures.

The invention therefore provides a dairy blend comprising an homogenous composition of butter and a vegetable oil formed by softening the butter sufficiently so that it can be blended, blending a water soluble gelling agent with the butter and then blending in the vegetable oil and finally cooling the product. The starting material is preformed butter. The term butter is to be construed to include such as lactic butter. The method of formation of the dairy blend of the invention will depend upon the butter source. Thus the butter is softened sufficiently to permit blending of the other ingredients of the composition with avoidance of over softening. The consistency of butter will vary from season to season from whether it is freshly churned and then fed directly, for example in a continuous process, into the process of the invention or whether the butter has been first subjected to cold storage. Freshly churned butter will tend to be softer than butter which has previously been held in cold storage and may therefore be usable directly without additional softening by heating or else the blending apparatus may generate sufficient heat in stirring the butter to soften the butter sufficiently for the process of the invention.

Butter which is too hard to be workable in a blender will need to have heat applied. In applying heat it is impartant that localised over heating be avoided. If any portion of the butter is overheated, that portion on cooling may not retain the desired consistency of butter.

Thus when heating is necessary, the heating method will desirably employ low temperature gradients so that the temperature of the batch of butter will desirably be uniformly increased.

The conditions necessary to soften the butter sufficiently to allow blending may in some situations require a degree of experimental testing but such will be well within the purview of a person skilled in the art.

With butter that has been previously stored in cold storage, heating the butter to a temperature of about 30 to 35°C will generally soften the butter sufficiently for blending to take place.

To the softened butter a water soluble gelling agent is blended. The water soluble gelling agent is incorporated into the butter in the form of a partially pre-formed gel in water. Generally the gelling agent is first dissolved in hot water and then on cooling the gel will partially form.

Water is present mainly as a vehicle for achieving an homogenous blend of the butter and selling agent. It is also present as a vehicle to introduce other additive such as salt emulsifiers and stabilizers as mentioned below.

The water soluble gelling agent can be of the type which forms a solid gel or can be of the type which may more properly be termed a thickening agent. Furthermore, amounts of the gelling agent may be employed such that a thickening effect rather than a full gelling effect is achieved.

Mixtures of one or more gelling agents can be employed. While the effect of the gelling agent is not fully understood by the applicant, it appears that cold water solubility of the agent is desirable and, therefore, it may well be that any water in the final composition which becomes free, is absorbed by the gelling agent *in situ* and thus the consistency of the composition remains relatively constant.

A currently preferred gelling agent is gelatine because of the availability, good water solubility and gelling power but gelling agents selected from the following are also considered to be suitable:

sodium carboxy-methyl cellulose, methyl cellulose, hydroxypropyl-methyl cellulose, gyar gum, xanthan gum, sodium alginates, low methoxy-pectin, propylene glycol alginate.

Such gelling materials or thickening agents can also be termed stabilizers. Gelatine in admixture with a product sold under the trade mark "Gelcol 120 C" by Davis Gelatine (N.Z.) Limited is a preferred gelling agent of the invention. "Gelcol 120 C" is a proprietary mixture sold as a stabilizer and emulsifier and is believed to contain some gelatine and an additional stabilizer as well as an emulsifier.

The amount of gelling agent employed will be in small amounts. The amounts can vary depending upon the particular type of material being employed. Generally the total amount of gelling agent can be up to 3% by weight of the total composition but desirably is in the region of 0.5 to 1.5%.

The preferred mixture of gelatine with "Gelcol 120 C" is desirably in the proportions of one part of gelatine to up to ten parts by weight of "Gelcol 120 C", more preferably one part of gelatine to 5.5—6.5 parts of "Gelcol 120 C".

"Gelcol 120 C" as mentioned above also incorporates an emulsifier and an emulsifier is a most preferred additive in the invention in aiding the consistency retaining properties of the final composition. The amount of emulsifier that may be used will be dependent upon the amounts of butter, water and vegetable oil.

Salt is a further desirable additive as it appears to assist the dispersion of the gelling agent when forming the solution of the gelling agent in water. Moreover it adds a taste factor. Salt when present will be added up to suitable taste levels generally in the range of less than 0.5% by weight, more preferably in the range of 0.3 to 0.4%.

The gelling agent, emulsifier and salt (when such individual ingredients are present) are all predissolved in water before addition to the butter. The amount of water can vary in a minimum from that required to form a solution of the substances and in the case of the gelling agent so that the composition is in a sufficiently fluid state to be blended with the butter. The maximum amount of water is dependent upon retention of the consistency of butter in the final composition. If too much water is present the product tends to lose the consistency of butter even at refrigeration temperatures becoming more fluid. The water content can vary from about 10% up to 45% by weight of the total composition.

As an alternative to water, it has been found that water containing milk solids can be used as an alternative to all or some of the water additionally present in the composition (besides that normally present in butter). Such materials can be water containing dissolved milk powder such as skim milk powder or full cream milk powder in various amounts as may be soluble or suspendible in water or milk itself such as skim milk, full cream milk. Such materials are generically referred to herein as milk.

The preformed solution of the gelling agents, emulsifiers, salt in water or milk or a mixture of water and milk is added to the softened butter. Blending of the softened butter and the water mixture is carried out to achieve a homogenous composition. Mixing is desirably controlled as too vigorous mixing can lead to incorporation of air which leads to a deterioration in the texture of the composition. On the other hand the incorporation of air can be avoided by using a vacuum blender.

After blending the ingredients, the mixture can be left to stand without general detriment to the product but where continuous processing is desired, the blended product can be fed almost immediately to the next processing step. During the blending of the product and the other ingredients more cooling of the mixture may occur and the mixture can be left to cool further down to room temperature after blending has been completed before the next processing step but again this is not essential.

The vegetable oil is then added to the blended mixture of the butter and the mixture of the other ingredients with water. The vegetable oil is a deodorized refined vegetable oil. Some vegetable oils can be deodorized to achieve an almost completely bland taste. These materials are preferred for use in the invention subject to the further desirable factors mentioned below. Some vegetable oils have a higher melting point than other materials and desirably lower melting point oils will be used in preference to the higher melting point oils where this particular factor is the sole point of distinction in comparison to other factors such as cost and availability. Desirable vegetable oils which can be used are selected from cotton seed, maize, peanut, rape seed, sunflower, safflower and soya bean oils with the most preferred oils being cotton seed oil or rape seed oil.

The amount of vegetable oil that is to be added is dictated in the minimum by the achievement of improved spreadability of the final composition, particularly at refrigeration temperatures. Moreover too little of the vegetable oil does tend to reduce the smoothness of the product. On the other hand too much of the vegetable oil tends to make the butter too soft outside of refrigeration conditions. The preferred amounts of the oil lie between 20 to 45% by weight of the butter with

most desirable results being achieved in the range of 30 to 40%, most preferably 35 to 37%.

The vegetable oil is added to the preformed blend of butter and the other ingredients mentioned above, desirably with continuous mixing in a manner to again achieve uniform consistency while inhibiting the incorporation of large amounts of air. Again to avoid the latter problem a vacuum blender can be used. The vegetable oil assists the softening effect on the butter achieved with the gelled mixture and also further improves the texture. Without the vegetable oil the butter is not spreadable straight out of the refrigerator.

After mixing of the vegetable oil and the butter composition the composition is then cooled under a low temperature gradient. The cooling is to a temperature where the product does not freeze and hence will generally be above 0°C and less than 5°C. Referigeration temperatures are suitable and cooling can be achieved by placing the blended product in a refrigerator.

The mixture is then most preferably mixed again in a suitable blender such as a vacuum blender to then provide the final product.

The balance of the composition will be butter. The amount of butter will depend upon the quantity of water (or milk) that is desired in the product. Once the amount of water is selected then the desired relative proportions of butter to the vegetable oil within the ranges mentioned above will dictate the amount of butter required. For example with a water content of 22% with an oil/butter ratio of 36%, the butter content will be about 56% of the final composition with the oil content of about 20%.

Further additives such as antioxidants, preservatives, flavouring agents and vitamins can be added to the composition desirably by incorporating in the water mixture. In the blending stages it is desirable to inhibit the incorporation of air. As mentioned above a vacuum blender can be used. Alternatively the blending can be effected in an inert atmosphere (inert in that oxygen is absent) such as nitrogen. In the latter case improved softening effects on the butter can be achieved by vigorous blending to entrap nitrogen gas within the blend.

The following examples illustrate the invention.

Example 1

1000 g of butter previously subject to cold storage is softened by heating to 30°C by holding the butter in a water bath at 30°C.

A solution of 6.12 g salt, 2.52 g gelatine and 15.30 g "Gelcol 120 C" is prepared by dissolving the materials in 400 g boiling water and allowing the solution to cool to 40 to 45°C. The softened butter is then mixed with the partially gelled solution. The mixture is left to stand for 1 hour.

360 g of purified rape seed oil is then added to the mixture with continuous mixing.

The mixture is cooled to 4.5°C.

Example 2

In place of the purified rape seed oil the following purified and deoderized oils are substituted in equal amounts:

cotton seed oil
maize oil
peanut oil.

The product was similar to that of Example 1.

Example 3

In place of water in Example 1 an equal volume of milk was used. Again the product was similar to that of Example 1.

Example 4

Repeating Example 1 except that after mixing the softened butter with the partially gelled solution the mixture is then mixed without delay with the rape seed oil.

Again a satisfactory product was obtained.

Claims

1. A dairy blend comprising an homogenous composition of butter and a vegetable oil formed by softening butter sufficiently so that it can be blended, blending a water soluble gelling agent with the softened butter and then blending in the vegetable oil and finally cooling the product.

2. A dairy blend as claimed in Claim 1 wherein the butter is butter which is freshly churned and wherein the formation of the dairy blend of the invention the freshly churned butter is fed directly into the blending apparatus.

3. A dairy blend as claimed in Claim 1 wherein the butter employed is butter which has been previously subject to cold storage and is softened by heating.

4. A dairy blend as claimed in Claim 1 wherein the water soluble gelling agent is incorporated into the softened butter by first forming a partially preformed gel in water or milk.

5. A dairy blend as claimed in Claim 4 wherein the gelling agent is gelatine, sodium carboxymethyl cellulose, methyl cellulose, hydroxypropylmethyl cellulose, gyar gum, xanthan gum, sodium alginates, low methoxy-pectin or propylene glycol alginate.

6. A dairy blend as claimed in Claim 4 wherein the gelling agent comprises a mixture of two or more gelling agents.

7. A dairy blend as claimed in Claim 1 wherein in the formation of the dairy blend an emulsifier is incorporated.

8. A dairy blend as claimed in Claim 7 wherein the emulsifier is incorporated with the gelling agent in solution in water.

9. A dairy blend as claimed in Claim 1 additionally containing salt.

10. A dairy blend as claimed in Claim 1 containing water, in addition to the content of water in the butter, in an amount from 10% to 45% by weight of the total composition.

11. A dairy blend as claimed in Claim 10 wherein the proportion of vegetable oil to butter is in the range of 20 to 45% by weight of the butter.

12. A dairy blend as claimed in Claim 1 wherein the vegetable oil is selected from cotton

seed, maize, peanut, rape seed, sunflower, safflower and soya bean oils.

13. A dairy blend as claimed in Claim 1 wherein the product is cooled to a temperature of between 0°C and 5°C and is then remixed.

14. A dairy blend as claimed in Claim 1 wherein blending of the individual ingredients is carried out in an apparatus which excludes the presence of air.

15. A process for the production of a dairy blend as claimed in Claim 1 wherein softened butter is blended with a water soluble gelling agent and then with vegetable oil and the product cooled.

16. A dairy blend as claimed in Claim 1 substantially as herein described with reference to the Examples.

17. A process for producing a dairy blend as claimed in Claim 1 substantially as herein described with reference to the Examples.

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